User Guide

PowerCage Fiber Optic Extenders

PowerCage™ FOX Tx/Rx AV

Fiber Optic Transmitter and Receiver

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-1914-01 Rev. A
09 10

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'Il y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过 。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, **click here**.

Notational Conventions Used in this Guide

TIP: A tip provides a suggestion to make setting up or working with the device easier.

NOTE: A note draws attention to important information.

CAUTION: A caution warns of things or actions that might damage the equipment.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

Trademarks

All trademarks mentioned in this guide are the properties of their respective owners.

Contents

Introduction

This section gives an overview of the Extron PowerCage FOX Tx/Rx AV fiber optic extender boards, describes their significant features, and provides a sample application diagram.

- About this Guide
- About the PowerCage FOX Transmitter and Receiver
- Features

WARNINGS: The PowerCage FOX Tx/Rx AV outputs continuous invisible light (Class 1 rated), which may be harmful and dangerous to the eyes; use with caution.

- ***Do not look*** into the rear panel fiber optic cable connectors or into the fiber optic cables themselves.
- Plug the attached dust caps into the optical transceivers when the fiber optic cable is unplugged.

About this Guide

This guide contains information about the PowerCage FOX Tx/Rx AV fiber optic extenders, with instructions for experienced installers to install, configure, and operate the equipment. Unless otherwise specified, references in this manual to the "AV board" or "PowerCage FOX AV" relate to the features or operation of the PowerCage FOX Tx/Rx AV.

The term "transmitter" refers to both multimode and singlemode transmitters and "receiver" refers to both multimode and singlemode receivers.

About the PowerCage FOX Tx/Rx AV Transmitter and Receiver

The Extron PowerCage FOX Tx/Rx AV Fiber Optic Extenders consist of a modular transmitter and receiver board pair for the PowerCage enclosure, providing long distance transmission of standard definition video, audio, and data (RS-232) signals over a fiber optic cable at rates of up to 2 Gbps.

The double-slot board design of the PowerCage FOX Tx/Rx AV allows for up to eight transmitters or receivers to be installed in the PowerCage enclosure. The PowerCage FOX Tx/Rx AV transmitter and receiver are hot-swappable, meaning that the boards can be replaced or upgraded without the need to power down the system.

The 1310 nm singlemode module of the PowerCage FOX Tx/Rx AV board carries signals up to 30 km (18.75 miles) while the 850 nm multimode module carries signals up to 2 km (6561 feet).

NOTE: The transmitter and receiver must be compatible. Both must be singlemode or both must be multimode in order to transmit a readable signal.

System Compatibility

The PowerCage FOX Tx/Rx AV video units are compatible with the FOX Tx/Rx AV fiber optic video transmitter and receiver and with the FOX Series distribution amplifiers, switchers, and matrix switchers. However, they are **not** compatible with the following Extron products:

- FOXBOX
- FOX 500 (RGB) and FOX 500 DVI
- FOX 500 DA6
- FOX 3G HD-SDI
- PowerCage FOX 3G HD-SDI Series
- PowerCage FOX VGA and DVI

Cable Transmission Modes

The transmitters and receivers are further categorized by the type of fiber optic cable, multimode or singlemode, which defines the effective range of transmission:

- **Multimode** — Long distance: up to 2 km (6,561 feet) (depending on the fiber cable)
  - PowerCage FOX Tx AV MM
  - PowerCage FOX Rx AV MM
- **Singlemode** — Very long distance: up to 30 km (18.75 miles)
  - PowerCage FOX Tx AV SM
  - PowerCage FOX Rx AV SM

NOTE: The multimode and singlemode products are physically and functionally identical, except for the effective range of transmission. In this guide, any reference applies to either transmission mode unless otherwise specified.

General System Operation

The PowerCage FOX Tx/Rx AV transmitter accepts a single low resolution video signal (composite, S-video, or low resolution component video). It accepts audio and one-way (transmitter-to-receiver) RS-232 serial communication (for applications such as projector control). The transmitter converts all of its incoming signals into a proprietary format signal, which it outputs on a single fiber optic cable to the PowerCage FOX Rx AV receiver. An optional return (receiver-to-transmitter) stream of serial RS-232 communications, such as projector responses, requires a second fiber optic cable. Instead of the return RS-232 communications, the receiver can be configured to output a daisy-chained primary fiber optic signal to another receiver.

The PowerCage FOX Tx/Rx AV receiver outputs a single low resolution video signal (composite, S-video or low resolution component video), which is not compatible with RGB or HDTV 480p, 720p, or 1080i component video signals. The receiver converts the proprietary signal back to video, audio, and serial RS-232 communication (matching the display requirements) and outputs the signals locally. The Extron Simple Instruction Set (SIS™) commands are used to configure the receiver to convert between signal formats. If either RS-232 return or daisy-chained communications are implemented (a second fiber optic cable is installed), the receiver outputs a proprietary signal on the second fiber cable.

The transmitter and receiver have image and audio adjustments available under RS-232 control. Both units have fiber light status indicators and lost-light alarm connectors.

The receivers have built-in alternating pixels, color bars, and grayscale test patterns to assist in setting up the display equipment.

Features

Digitized signal transmission — Digitized transmission ensures perfect signal transmission. The non-linearity of the fiber components does not affect signal quality. Light can be distributed and repeated without signal degradation or compression.

Long distance transmission — Signals may be transmitted up to 2 km (6561 feet) over multimode (MM) fiber or up to 30 km (18.75 miles) over singlemode (SM) fiber.

Daisy chain capability — The system can be expanded to provide output for up to 10 display devices.

Integration friendly — A variety of connectors permits input and output of composite, S-video, or low resolution component video signals. Compatibility with the Extron fiber matrix switchers allows the units to be integrated into more complex A/V systems.

Transmits multiple signal types — Video, audio and data signals can all be transmitted simultaneously over one fiber. The units transmit composite, S-Video, or low resolution component video signals and are compatible with NTSC, PAL, and SECAM standards.

All digital, zero compression technology — The PowerCage FOX Tx/Rx AV delivers uncompressed pixel-for-pixel transmission of video signals to ensure optimal image quality.

Auto Input Format Detection — The PowerCage FOX Tx/Rx AV transmitter can be set to detect the incoming video signal format, automatically reconfiguring itself to transmit the signal. This feature can reduce the number of required outputs for a matrix switcher, lowering system cost while improving manageability.

Encoding and decoding — The PowerCage FOX Tx AV converts incoming signals to a proprietary format that is passed along the fiber optic cable to the PowerCage FOX Rx AV. At the other end of the cable, the receiver converts the signal to the low resolution format that matches the needs of the display device.

Output Video Formatting — You can set the output video signal format (composite, S-Video, or component) or follow the format of the source device (video follow).

Picture and audio adjustments — Available picture adjustments include color, tint, contrast, and brightness. Audio adjustments include input gain and attenuation, and output level. Both audio and video can be muted.

Troubleshooting features — A variety of LED signals and indicators allow easy diagnosis of problems.

Easy configuration — The units can be configured using SIS commands or the FOX Extenders Control Program.

PowerCage FOX Tx/Rx AV Connection Diagram

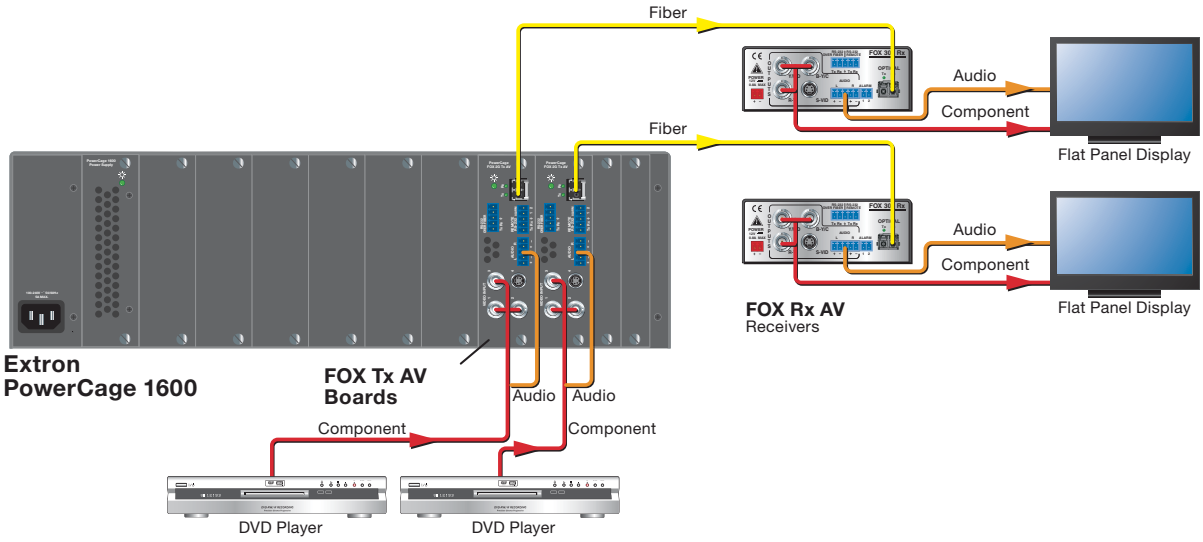


Figure 1. Typical Application for the PowerCage FOX Tx/Rx AV

Installation and Operation

This section describes the installation and operation of the PowerCage FOX Tx/Rx AV Tx/Rx, including:

- **Installing the PowerCage FOX Tx/Rx AV**
- **Rear Panel Connections and Indicators**
- **PowerCage Front Panel Port, Control, and Indicators**
- **Operation**

CAUTION: Installation and service must be performed by authorized personnel only.

Installing the PowerCage FOX Tx/Rx AV

The PowerCage FOX transmitter and receiver boards must be installed in an Extron PowerCage 1600 enclosure. See "**Installing the FOX Tx/Rx AV Board in the PowerCage 1600 Enclosure**" in the "Reference Information" section for the procedure.

Rear Panel Connections and Indicators

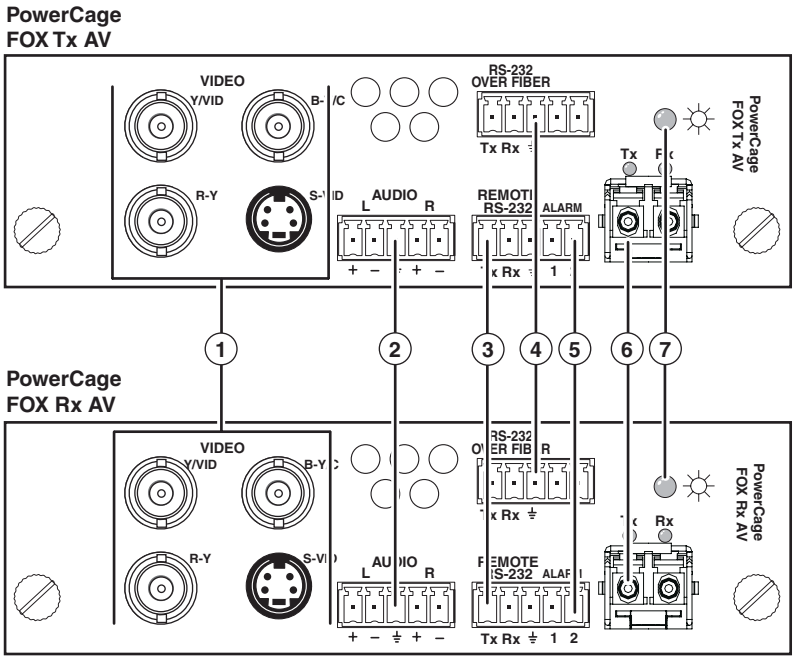


Figure 2. PowerCage FOX Tx/Rx AV Rear Panel Features

Video Connections

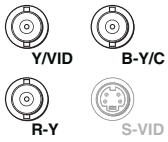
① **Video connectors** — Three BNC connectors and one 4-pin mini DIN S-video connector are available for video input and output.

The PowerCage FOX Tx/Rx AV inputs and outputs a single low resolution video signal (composite, S-video and low resolution component video). It is not compatible with RGB or HDTV 480p, 720p, or 1080i component video signals.

The transmitter converts incoming signals to a proprietary format and passes them along the fiber optic cable to the PowerCage FOX Rx AV. The receiver converts the signal to a format that matches the display requirements. SIS commands are used to configure the receiver to convert between signal formats.

Component video

To input or output a low resolution component video signal, connect a device to the Y/VID, B-Y/C, and R-Y receptacles on the back panel of the unit, as shown at right.

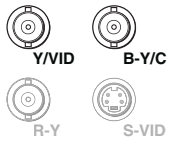


Component

S-video

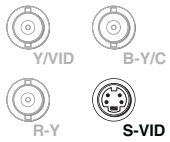
There are two alternative methods to input or output an S-video signal:

- Connect a device to the female Y/VID and B-Y/C BNC receptacles on the back panel.



S-video

- Connect a device to the female 4-pin mini DIN S-VID receptacle on the back panel.

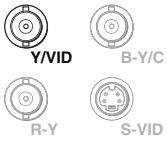


S-video

> **NOTE:** In addition to the selected output type, using BNC connectors, a transcoded S-video signal is always output from the receiver S-VID socket.

Composite video

To input or output a composite video signal, connect a device to the female Y/VID BNC receptacle on the back panel of the unit, as shown at right.



Composite

Signal priorities

In the table below the colored cells indicate which signal has the highest priority when both the BNC connectors and the 4-pin mini DIN provide simultaneous video input.

BNC Input	Mini DIN Input
Component	S-video
S-video	S-video
Composite	S-video

Audio Connections

② **Audio connector** — Audio is input to the PowerCage FOX AV transmitter and output from the PowerCage FOX AV receiver through this 3.5 mm, 5-pole, captive screw connector. Input and output can be either two discrete mono or one stereo and can be balanced or unbalanced, depending on the wiring connections. The illustrations below show how to wire the audio sources and outputs.

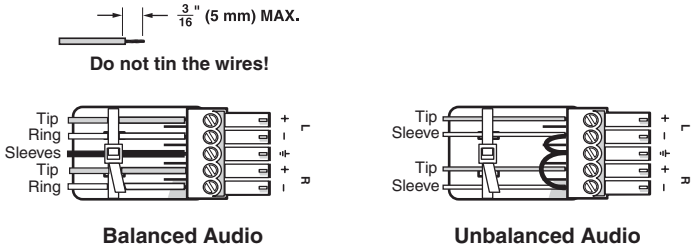


Figure 3. Audio Input Connections

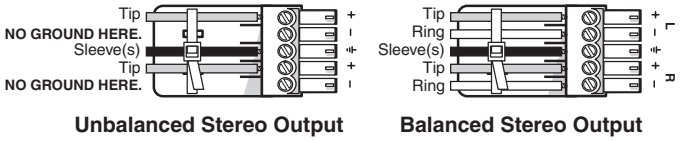


Figure 4. Audio Output Connections

CAUTIONS: The length of the exposed wires in the stripping process is critical. The ideal length is 3/16 inch (5 mm). If it is any longer, the exposed wires may touch, causing a short circuit between them. If the stripped portion is any shorter, the wires can be easily pulled out even if tightly fastened by the captive screws.

Do not tin the wires. Tinned wire does not hold its shape and can become loose over time.

The table below shows the initial gain differences between audio input and output using captive screw connectors. The gain for unbalanced output from the captive screw connector is half (-6 dB), regardless of input.

Input	Output	Gain
Balanced	Balanced	0 dB (unity)
Balanced	Unbalanced	-6 dB (half)
Unbalanced	Balanced	0 dB
Unbalanced	Unbalanced	-6 dB

You can make additional adjustments to audio gain and attenuation using SIS commands. See "**SIS Control**" in the "Remote Communication and Control" section.

RS-232 Connections

③ **RS-232 Remote port —** The first three poles of the RS-232 Remote 5-pole captive screw connector are used for RS-232 configuration and control. Wire the connector as shown below.

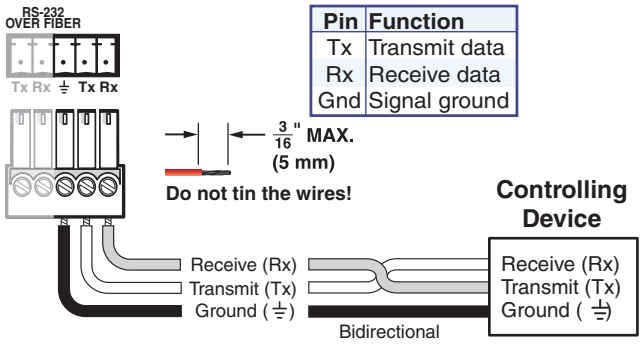


Figure 5. Rear Panel RS-232 Remote Port

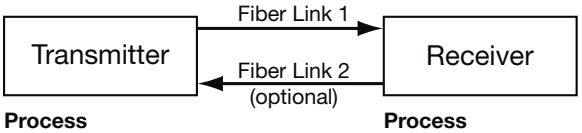
The Remote RS-232 connectors on the rear panels of the transmitter and receiver enable the units to be configured using SIS commands or the FOX Extenders Control Program, when it is connected to a control device. (The Over Fiber RS-232 connections allow pass-through to remote units.)

The protocol for the Tx and Rx ports is 9600 baud, no parity, 8 data bits, 1 stop bit, and no flow control.

SIS commands

When the PowerCage FOX Tx/Rx AV is configured by RS-232 commands, some commands are processed by the transmitter and others, by the receiver. The SIS commands do not distinguish between the two units. The system routes the commands based on where they are processed.

The following system block diagram shows which functions are processed by the transmitter and which are processed by the receiver.



Process
Input configuration
Audio gain

Process
Color
Tint
Brightness
Contrast
Video mute
Output configuration
Daisy chain/loop out mode
Audio mute
Audio output level

Figure 6. System Block Diagram

SIS commands for the PowerCage FOX Tx/Rx AV are shown in the "**Remote Communication and Control**" section.

NOTE: Both RS-232 Remote and RS-232 Over Fiber signals require fiber optic Link 1 **and** Link 2 for full functionality.

If only Link 1 is enabled, the ability to configure the system through SIS commands is limited by the lack of return communication from the receiver to the transmitter.

- All configuration carried out using the transmitter is processed normally because only fiber Link 1 is required for it.
- Queries from the transmitter about the status of receiver settings are not processed correctly because fiber Link 2 is required to carry the return signal.
- The receiver cannot be used to configure the transmitter because fiber Link 2 is required.

Lack of communication between the transmitter and the receiver can result in mismatches in the value settings of the two units, which may cause confusion with control systems or software applications. To avoid this, within 4 seconds of Link 2 becoming active, the receiver settings are automatically copied to the transmitter to ensure that settings for both units match.

NOTE: When the receiver settings are copied to the transmitter, existing transmitter settings are overwritten and it may be necessary to update those values.

④ **RS-232 Over Fiber connections —** The RS-232 Over Fiber connections allow pass-through to remote units. Wire the Over Fiber portion of the 5-pole captive screw connector as shown below:

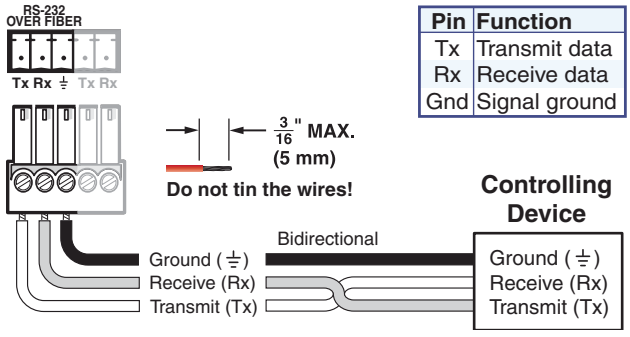
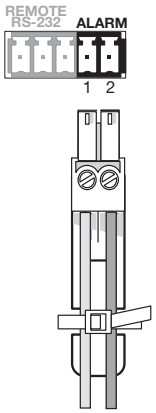


Figure 7. Captive Screw Connection for Rear Panel RS-232 Over Fiber Port

In addition, on the rear panel, the units have RS-232 Over Fiber pass-through ports. These ports allow RS-232 commands to be passed from the control device to remote devices over the fiber optic cable with speeds up to 115 kbps.

NOTE: The PowerCage FOX Tx/Rx AV does not respond or generate a response to any commands passed through the RS-232 Over Fiber ports. Refer to the user guide of the device being controlled for the appropriate SIS commands.

Alarm



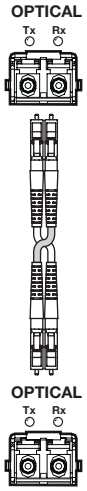
⑤ **Alarm connector** — When an alarm is connected to it, a warning signal is issued through the two rightmost poles of the 5-pole RS-232 Remote/Alarm captive screw connector when light signals have been disconnected, lost, or broken.

The alarm pins, labeled 1 and 2, (see the illustration at right) of this contact closure port act are shorted together when the signal is lost. The port does not produce any discrete on and off voltage signals but acts as an internal relay that either connects or disconnects an external alarm circuit.

- For the PowerCage FOX AV transmitter, the alarm state is activated when link 2 is absent.
- For the PowerCage FOX AV receiver, the alarm state is activated when link 1 is absent.
- When power is lost, the alarm state is activated for both units.

NOTE: Strip the wires using the same methods shown for the **audio connections**, earlier in this section.

Fiber Optic Connection



⑥ **Optical connector —** An LC duplex SFP connector links the transmitter and receiver. An LED above each port lights when the port receives a signal.

- The optical Rx port on the **receiver** unit lights when a signal from fiber **link 1** reaches the receiver.
- The optical Rx port on the **transmitter** unit lights when a signal from **link 2** reaches the transmitter.

The transmitter and receiver units of the PowerCage FOX Tx/Rx AV are connected by an LC duplex SFP connector. Fiber optic link 1 connects the Tx port of the transmitter and the Rx port of the receiver. It carries video, audio, and data output from the transmitter to the receiver.

Fiber optic link 2 connects the Tx port of the receiver with the Rx port of the transmitter. It carries only the responses to RS-232 commands and is not required for transmitting video and audio signals.

However, if link 2 is not enabled, the ability to configure the system through SIS commands is limited by the lack of communication from the receiver to the transmitter. All commands issued through the transmitter are valid but responses to status queries may return invalid data.

Signals can be transmitted 2 km (6561 feet) over multimode (MM) fiber and 30 km (18 miles) over singlemode fiber (see the "**Operating distance**" specification in the "Reference Information" section). A MM transmitter must always be connected to a MM receiver and a SM transmitter can only be connected to a SM receiver.

WARNINGS: The PowerCage FOX Tx/Rx AV outputs continuous invisible light (Class 1 rated), which may be harmful and dangerous to the eyes; use the product with caution.

- ***Do not look*** into the rear panel fiber optic cable connectors or into the fiber optic cables themselves.
- Plug the attached dust caps into the optical transceivers when the fiber optic cable is unplugged.

Daisy chain connection

PowerCage FOX Rx AV receivers have a loop-out mode that allows a signal to be passed from the receiver along a daisy chain of to up to ten receivers, with a display device attached to each receiver. The loop-out mode is set using RS-232 commands (see the **`Daisy Chain` command** in the "SIS Control" section) or the FOX Extenders control program (refer to the program help file) for more information.

All receivers in the daisy chain must be compatible; that is, they must all be SM or all be MM models, connected with the appropriate fiber optic cables. Each receiver receives a signal at its Rx fiber optic port and passes the signal to the next unit through its Tx port.

NOTES:

- In daisy chain mode, the Tx port is used to pass audio and video signals to the next receiver in the daisy chain. As a result, the Tx port is not available for bidirectional communication and there are limitations on system configuration with SIS commands.
- When multiple receivers are in daisy chain mode, RS-232 commands issued through the transmitter are passed to every receiver; however, commands issued through a receiver apply only to that receiver. Configuring each receiver independently matches each output signal to the unique needs of the display device.

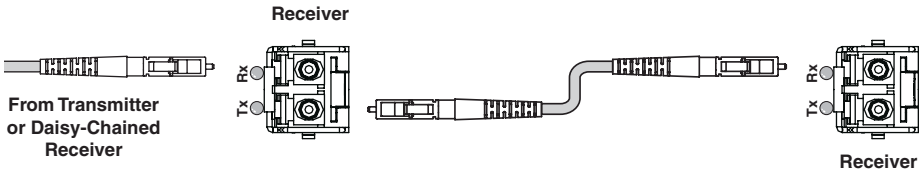


Figure 8. Connections for Daisy Chain Mode

Power Indicator

⑦ **Power LED —** This LED lights when the unit is receiving power.

PowerCage 1600 Front Panel Port, Control, and Indicators

The following features are on the front panel of the PowerCage 1600 enclosure.

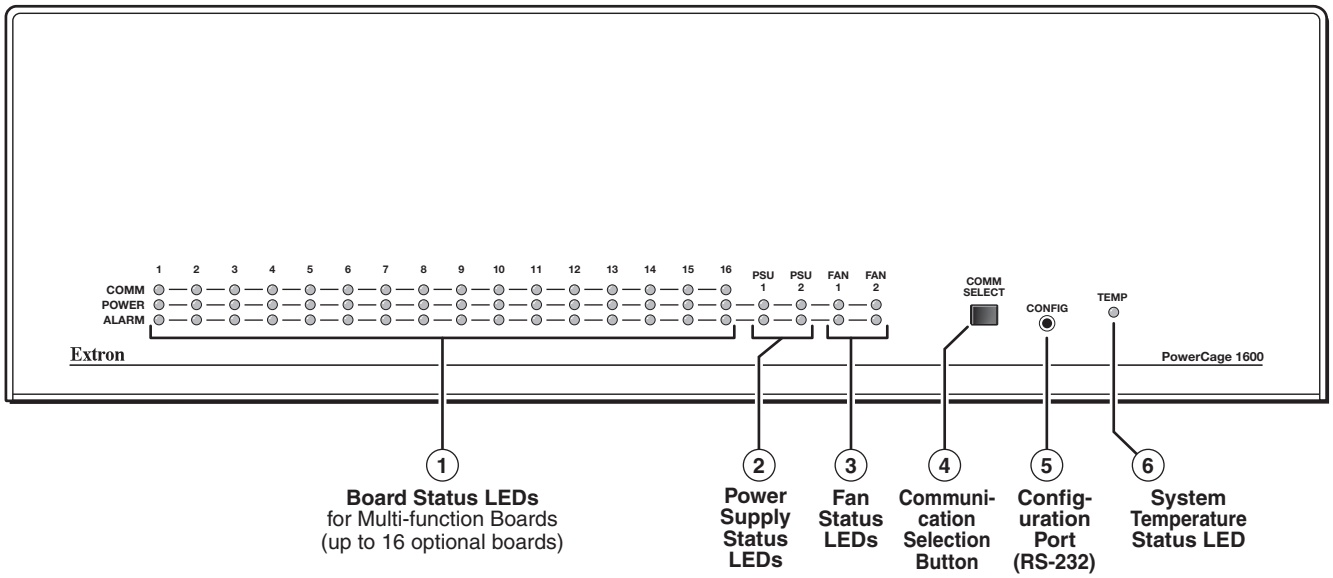
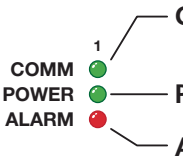


Figure 9. PowerCage 1600 Enclosure Front Panel

① **Board status LEDs: Comm, Power, Alarm (16 board locations)** — There is one set of these LEDs for each of the 16 rear panel slots that is available for boards. If a board is installed in the identically-numbered slot, the LEDs light under the following circumstances:

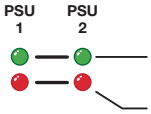


Comm LED — Lights when the corresponding board is selected and can be communicated with via the front panel Config port.

Power LED — Lights when the corresponding board is receiving power.

Alarm LED — Lights when the fiber link on a PowerCage FOX board is broken or disconnected. This feature depends on the model of PowerCage board.

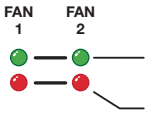
② **Power supply (PSU) status LEDs (2 power supply locations)** — These pairs of LEDs correspond to the primary (included) power supply and the redundant (optional) power supply. For each power supply, the LEDs light as follows:



Power LED — Lights when the power supply is receiving power.

Alarm LED — Lights when the power supply malfunctions, such as providing an overvoltage (14 VDC or more) or an undervoltage (10.5 VDC or less).

③ **Fan status LEDs (2 fan locations)** — These pairs of LEDs indicate whether the two fans are functioning correctly. For each fan, the LEDs light as follows:



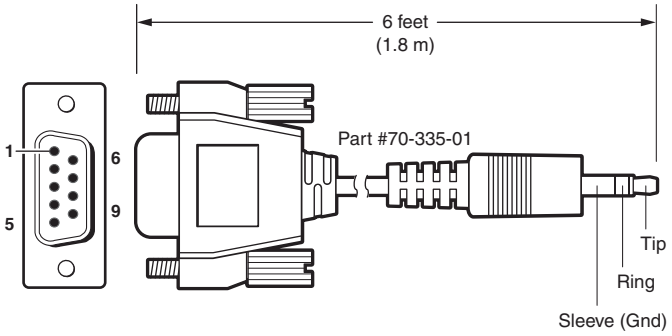
Power LED — Lights when the corresponding fan is receiving power.

Alarm LED — Lights when the corresponding fan malfunctions.

CAUTION: If a power supply or fan status Alarm LED lights, remove power from the unit and contact Extron S3 Sales & Technical Support Hotline.

④ **Comm Select button** — Repeatedly press this button as necessary to select the board to be connected to the Configuration port (item ⑤). The Comm LED (item ①) for the selected board lights.

⑤ **Config port** — This 2.5 mm mini stereo jack serves the same serial communications function as the Remote RS-232 port on the transmitter or receiver board, but is easier to access than the ports on the boards after the units have been installed and cabled. The 9-pin D to 2.5 mm mini jack TRS RS-232 cable (shown below), provided with the enclosure, can be used for this connection.



9-pin D	Connection	TRS Plug
Pin 2	Computer Rx line	Tip
Pin 3	Computer Tx line	Ring
Pin 5	Computer signal ground	Sleeve

Figure 10. Pinout for the 9-pin TRS RS-232 Cable

NOTES:
- This port is for remote control of the transmitter or receiver, not for the over fiber RS-232 link.
- This port parallels the Remote RS-232 ports on the boards. If an active front panel configuration connection is made, the Remote RS-232 port on the PowerCage FOX Tx/Rx AV board becomes inactive.
- The maximum distances from the transmitter or receiver to the controlling device can vary up to 200 feet (61 m). Factors such as cable gauge, baud rates, environment, and output levels (from the unit and the controlling device) all affect transmission distance.

  Distances of up to 50 feet (15 m) are typically not a problem. In some cases, the unit may be capable of serial communications via RS-232 up to 250 feet (76 m) away.

This port has the following protocols:

- 9600 baud
- no parity
- 8 data bits
- 1 stop bit
- no flow control

⑥ **Temp LED** — This LED lights to indicate that the temperature within the PowerCage enclosure is at a dangerously high temperature (approximately 167 °F [75 °C]) and that equipment damage is imminent.

CAUTION: If this LED lights, remove power from the unit and contact Extron S3 Sales & Technical Support Hotline.

Operation

After the transmitter, all receivers, and their connected devices are powered up, the system is fully operational. If any problems occur, verify that the cables are routed and connected properly and that all display devices have identical resolutions and refresh rates. If problems persist, call the Extron S3 Sales & Technical Support Hotline. See the **contact numbers** on the last page of this guide for the Extron office nearest you.

To take advantage of the various adjustments and test patterns available on the PowerCage FOX Tx/Rx AV, connect a computer or other RS-232 capable device to the Remote/RS-232 port on either board or to the Config port on the PowerCage 1600 front panel and operate the system using either **SIS commands** or the **FOX Extenders Control Program**.

Remote Communication and Control

This section describes the remote control operation of the PowerCage FOX Tx/Rx AV, including:

- **SIS Control**
- **FOX Extenders Control Program**

RS-232 Ports

The transmitter and receiver boards each have an RS-232 serial port on a 3-pin captive screw connector that can be connected to a host device such as a computer running the HyperTerminal utility, an RS-232 capable PDA, or a control system. The PowerCage enclosure has a Configuration port, a 2.5 mm mini stereo jack, that parallels the board ports. These ports make serial control of the transmitter and receiver possible.

The protocol for both ports is:

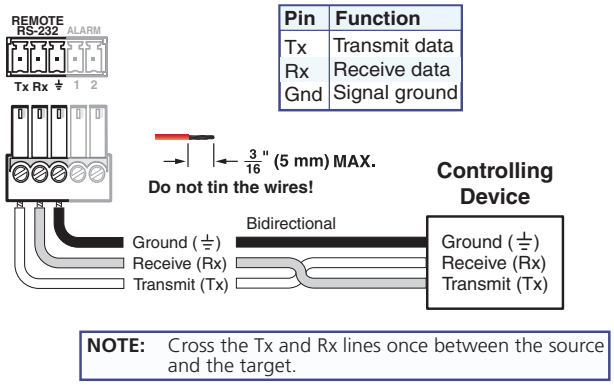
- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits

NOTES:

- For each PowerCage FOX Tx/Rx AV board, the Remote RS-232 port is active only if the Config port on the PowerCage enclosure is not active. If an active configuration port connection is made, the Remote RS-232 port on the board becomes inactive.
- Only one fiber optic cable, transmitter-to-receiver, is required for video, audio, and serial command transmission. However, if you connect only one fiber optic cable, you do **not** receive RS-232 reports from the controlled device, and there is **reduced** RS-232 command and control program functionality on the Rx unit. To receive responses from the controlled device and for full functionality, install both fiber optic cables and set the receiver to its normal configuration (via the **`Enable return link`** SIS command for the PowerCage FOX Rx AV).

Remote Port on the PowerCage FOX Tx/Rx AV Board

The Remote RS-232 captive screw port is located on the rear panel of the PowerCage FOX Tx/Rx AV. The pin assignments for this port are shown below.



Pin	Function
Tx	Transmit data
Rx	Receive data
Gnd	Signal ground

NOTE: Cross the Tx and Rx lines once between the source and the target.

Figure 11. Remote Connector Pin Assignments

Configuration Port on the PowerCage Front Panel

The Extron 9-pin D to 2.5 mm mini jack TRS RS-232 cable, provided with the PowerCage 1600 Enclosure, can be used for connection to the Config port on the enclosure front panel. For pin assignments for this port, see "⑤ **Configuration port**" under "PowerCage 1600 Front Panel Port, Control, and Indicators" in the "Installation and Operation" section.

SIS Control

Host-to-Unit Instructions

SIS commands consist of one or more characters per field. No special characters are required to begin or end a command character sequence. When a command is valid, the unit executes the command and sends a response to the host device. All responses from the unit to the host end with a carriage return and a line feed (CR/LF = ↵), which signals the end of the response character string. A string is one or more characters.

Introduction to SIS

SIS commands consist of a string of one or more characters per command field. Commands do not require any special characters to begin or end the command string. Each response from the unit ends with a carriage return and a line feed (CR/LF = ↵), which signals the end of the response character string. When the PowerCage FOX Tx/Rx AV unit is first switched on, it sends one of the following messages, depending on the model:

- (C) Copyright 2010, Extron Electronics PowerCage FOX Tx AV, V*x.xx*, 70-702-11↵ (for multimode)
- (C) Copyright 2010, Extron Electronics PowerCage FOX Tx AV, V*x.xx*, 70-702-12↵ (for singlemode)
- (C) Copyright 2010, Extron Electronics PowerCage FOX Rx AV, V*x.xx*, 70-702-21↵ (for multimode)
- (C) Copyright 2010, Extron Electronics PowerCage FOX Rx AV, V*x.xx*, 70-702-22↵ (for singlemode)

where V *x.xx* is the firmware version number and 70-702-*xx* is the product number.

Symbols Used in this Guide

When you are programming SIS commands, certain characters are most conveniently represented by the hexadecimal equivalent of their ASCII value. The table below shows the hexadecimal equivalent of each ASCII command:

Space →

ASCII to Hex Conversion Table										Esc	1B	CR	ØD	LF	ØA
	2Ø	!	21	"	22	#	23	$	24	%	25	&	26	'	27
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F
Ø	3Ø	1	31	2	32	3	33	4	34	5	35	6	36	7	37
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F
@	4Ø	A	41	B	42	C	43	D	44	E	45	F	46	G	47
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F
P	5Ø	Q	51	R	52	S	53	T	54	U	55	V	56	W	57
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F
`	6Ø	a	61	b	62	c	63	d	64	e	65	f	66	g	67
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F
p	7Ø	q	71	r	72	s	73	t	74	u	75	v	76	w	77
x	78	y	79	z	7A	{	7B	I	7C	}	7D	~	7E	DEL	7F

NOTE: Apart from **G** (gain) and **g** (attenuation), upper- and lowercase characters can be used interchangeably in SIS commands for this product. For example, either "C" or "c" can be used to set the color value in the **Color** commands.

The symbols (Xn values) defined in this section are the variables used in the fields of the **Command/Response Table** that begins on page 19.

↵ = carriage return with line feed

← = carriage return (no line feed)

• = space character

Esc = Escape key (hex 1B)

X1 = Input video type
0 = auto (default)
4 = component
5 = S-video
6 = composite

X5 = On or Off status
0 = Off
1 = On

X6 Link 2 status
0 = Link 2 disabled
1 = Link 2 enabled (default)
2 = Daisy chain mode enabled on receiver

X8 = Picture adjustment: color, tint, contrast, or brightness (0 to 127). Default is 64.

X10 = Memory presets (1 to 30)

X11 = Audio gain (0 to 10 dB) Default is 0.

X12 = Audio attenuation (-18 to 0 dB) Default is 0.

X13 = Audio level adjustment (-18 to +10 dB)

X15 = Output video format
0 = Follow input type
6 = Component
7 = S-video
8 = Composite

X17 = Test patterns
0 = Test pattern off
1 = Color Bars
2 = Grayscale
3 = Alternating pixels

X18 = Audio gain response (0 to 18)

X19 = Audio attenuation response (0 to -18)

X21 = SM (singlemode) or MM (multimode)

X22 = Tx (transmitter) or Rx (receiver)

X23 = Internal temperature in degrees Fahrenheit and Celsius: (xxxF xxC)

Error Messages

E10 — Invalid command

E13 — Invalid parameter

E14 — Not valid for this configuration

Command/Response Table for SIS Commands

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Picture adjustments			
Input video format:			
Input video type	X1\	Typ X1 ↵	Set format X1 for the selected input video signal type. For X1: 0 = Auto (default) 4 = Component 5 = S-video 6 = Composite
View current input setting	\	X1 ↵	Display the current input video format.
Color:			
Color value	X8C	Col X8 ↵	Select color value X8. X8 = 0 through 127. Default = 64.
Increment color value	+C	Col X8 ↵	Select the next higher color value (increase color value by 1).
Decrement color value	–C	Col X8 ↵	Decrease color value X8 by 1.
View current color value	C	X8 ↵	Display current color value X8.
Tint:			
Specify tint value	X8T	Tin X8 ↵	Set tint value X8 for the video signal. X8 = 0 to 127. Default = 64.
Increment tint value	+T	Tin X8 ↵	Increase tint value X8 by 1.
Decrement tint value	–T	Tin X8 ↵	Decrease tint value X8 by 1.
View current tint value	T	X8 ↵	Display current tint value X8.
Contrast:			
Specify contrast value	X8^	Con X8 ↵	Set contrast value X8 for the video signal. X8 = 0 to 127. Default = 64.
Increment contrast value	+^	Con X8 ↵	Increase contrast value X8 by 1.
Decrement contrast value	–^	Con X8 ↵	Decrease contrast value X8 by 1.
View current contrast value	^	X8 ↵	Display current contrast value X8.
Brightness:			
Specify brightness value	X8Y	Brt X8 ↵	Set brightness value X8 for video signal. X8 = 0 through 127. Default = 64.
Increment brightness value	+Y	Brt X8 ↵	Increase brightness value X8 by 1.
Decrement brightness value	–Y	Brt X8 ↵	Decrease brightness value X8 by 1.
View current brightness value	Y	X8 ↵	Display current brightness value X8.

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Picture adjustments, continued			
Video mute:			
Enable mute	1B	Blk1↵	Mute the selected input.
Disable mute	0B	Blk0↵	Disable mute on the selected input.
View current blanking status	B	X5↵	Display current blanking status X5. For X5: 0 = Disable blanking or mute. 1 = Enable blanking or mute.
Output video format			
Specify output format	6*X15#	SynX15↵	Set format X15 of the output video signal. For X15: 0 = Follow input type (default) 6 = Component 7 = S-Video 8 = Composite
View current output setting	6#	X15↵	Display current output video format X15.
Memory presets			
Recall Preset	X10.	RprX10↵	Recall memory preset X10. A period (.) follows X10 in the command. X10 = 1 through 30
Save Preset	X10,	SprX10↵	Save memory preset X10. A comma (,) follows X10 in the command.
Audio mute			
Enable audio mute	1Z	Amt1↵	Mute the audio.
Disable audio mute	0Z	Amt0↵	Unmute the audio.
View mute status	Z	X5↵	Display current audio mute status X5. For X5: 0 = Unmute audio. 1 = Mute audio.
Audio gain and attenuation			
Set audio gain	X11G	Aud X18↵	Set value X11 of the audio gain. Use only uppercase **G** for configuring gain. The unit responds with gain level X18. X11 = 0 through 10 dB X18 = 0 through 10 Default = 0.
Set audio attenuation	X12g	AudX19↵	Set value X12 of audio attenuation. Use only lowercase **g** for configuring attenuation. The unit responds with attenuation level X19. X12 = 0 through –18 dB X19 = 0 through –18 Default = 0.

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Audio gain and attenuation, continued			
Increment audio level	+G +g	Aud[X13]↵ Aud[X13]↵	Increase the gain (G) or attenuation (g) of audio level [X13] by 1 dB. [X13] = –18 through +10 dB. Default = 0.
Decrement audio level	-G -g	Aud [X13]↵ Aud [X13]↵	Decrease the gain (G) or attenuation (g) by 1 dB. Audio level [X13] = –18 through +10 dB.
View current audio level	G g	Aud [X13]↵ Aud [X13]↵	Display current value Audio level [X13] for gain (G) or attenuation (g).
Audio output level			
Set to consumer level	40*0#	Lvl0↵	Set the audio output to the consumer level: –10 dBV (default level).
Set to professional level	40*1#	Lvl1↵	Set the audio output to the professional level: +4 dBu
View current output level status	40#	[X5]↵	Display current audio output level [X5]. For [X5]: 0 = consumer level 1 = professional level
Auto Memory			
Disable Auto Memory	55*0#	Img0↵	Disable Auto Memory.
Enable Auto Memory	55*1#	Img1↵	Enable Auto Memory (default). Parameters saved are color, tint, brightness, and contrast.
View current Auto Memory setting	55#	[X5]↵	View current Auto Memory setting [X5]. For [X5]: 0 = disabled; 1 = enabled
Auto-Image™			
Trigger	55*2#	Img↵	Trigger Auto-Image for the current input. Parameters adjusted are color, tint, brightness, and contrast.
Test pattern			
Color Bars	1J	Tst1↵	Select the Color Bars pattern.
Grayscale	2J	Tst2↵	Select the grayscale pattern.
Alternating pixels	3J	Tst3↵	Select the alternating pixels pattern.
Off	0J	Tst0↵	Select no test pattern.
View current test pattern status	J	[X17]↵	Show current test pattern [X17]. For [X17]: 0 = Test pattern off (default) 1 = Color Bars 2 = grayscale 3 = alternating pixels

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Disable and enable return link (link 2)			
Disable return link back to transmitter	66*0*0#	Rle*0*0↵	Disable the return link from the receiver to the transmitter.
Enable return link (normal mode)	66*0*1#	Rle*0*1↵	Enable the return link to the transmitter (default).
Daisy chain	66*0*2#	Rle*0*2↵	Enable daisy chain mode on the receiver.
View current return link status	66*0#	0*X6↵	Display the status of the return link from the receiver to the transmitter. For X6: 0 = Link 2 is disabled. 1 = Link 2 is enabled (default). 2 = Daisy chain mode is enabled on the receiver.
NOTE: This command is available only on the receiver unit; the transmitter responds with an E14 error code.			
Information Requests			
General information	I	1LnkX5·2LnkX5·VidX5·AudX5·X21·X22↵	Display the status (signal presence) of optical links 1 and 2, the video link, the audio link, the fiber optic transmission mode (singlemode or multimode), and the device type (Tx or Rx). **1Lnk** and **2Lnk** — for X5: 1 = an active signal is present. 0 = no signal is present. **Vid** — for X5: 1 = video signal is enabled. 0 = video signal is disabled. **Aud** — for X5: 1 = audio signal is enabled. 0 = audio signal is disabled. X21 = SM (singlemode) or MM (multimode). X22 = Tx or Rx.
Example	I	1Lnk1 2Lnk1 Vid1 Aud0 MM RX	Optical links 1 and 2 are enabled. The video signal is enabled and the audio signal is disabled. The unit is a multimode (MM) receiver (Rx).
Query firmware version	Q	*x.xx*↵	Display the current firmware version.
Query part number	N	70-702-*nn*↵	Display the unit part number.
Query other unit part number	1N	70-702-*nn*↵	Display the part number of other connected unit.

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Status Request			
View Link 1 Status	1S	X5↵	Displays Link 1 status X5. For X5: 0 = no link 1 = link present
View Link 2 Status	2S	X5↵	Display Link 2 (return link) status X5.
View input video status	3S	X5↵	Display input video status X5. For X5: 1 = a video signal is present. 0 = no video signal is present.
View input audio status	4S	X5↵	Display input audio status X5. For X5: 1 = an audio signal is present. 0 = no audio signal is present.
View internal temperature	20S	X23↵	Display internal temperature X23 in degrees F and C.
Reset to factory defaults			
System Reset (factory default)	EscZXXX←	Zpx↵	Reset unit to all factory default values.
Reset audio settings	EscZA←	Zpa↵	Reset all audio settings to factory default values
Reset presets	EscZG←	Zpg↵	Reset all memory presets to factory default values

SIS Command Validity Table

If only one fiber optic channel is enabled, the ability to configure the system through SIS commands is limited by the lack of return communication from the receiver to the transmitter.

- All commands issued through the transmitter are valid because the transmitter-to-receiver link (link 1) allows signals to be forwarded to the receiver. However, responses to queries originating from the transmitter about the status of the receiver return invalid data.
- All configuration of the receiver by commands issued through the receiver are valid. Attempts to configure the transmitter through the receiver in the absence of the return link (link 2) are invalid.

The following table shows the availability of commands issued through the receiver when only link 1 is active:

Adjustment	Validity
Color	Valid
Tint	Valid
Brightness	Valid
Contrast	Valid
Audio gain/attenuation	**Invalid**
Audio mute	Valid
Audio output level	Valid
Output configuration	Valid
Input configuration	**Invalid**
Daisy chain mode	Valid
Test pattern	Valid
Video mute	Valid

FOX Extenders Control Program

The Extron FOX Extenders Control Program communicates with the transmitter and receiver pair via the Remote RS-232 port on the rear panel of either FOX Tx/Rx AV unit or the Config port on the front panel of the PowerCage 1600 enclosure.

The program is compatible with Windows 2000, Windows XP, and later versions of Windows. Upgrades to the program can be downloaded from the Extron website (**www.extron.com**).

Installing the Software from the DVD

If you have an Extron software disk, install the FOX Extenders software from it as follows:

1. Insert the disk into your computer drive. If the disk does not start automatically, open your Windows Explorer and double-click **`Launch.exe`** on the disk drive to start it.
2. On the Extron Software DVD screen, click the **`Software`** button.

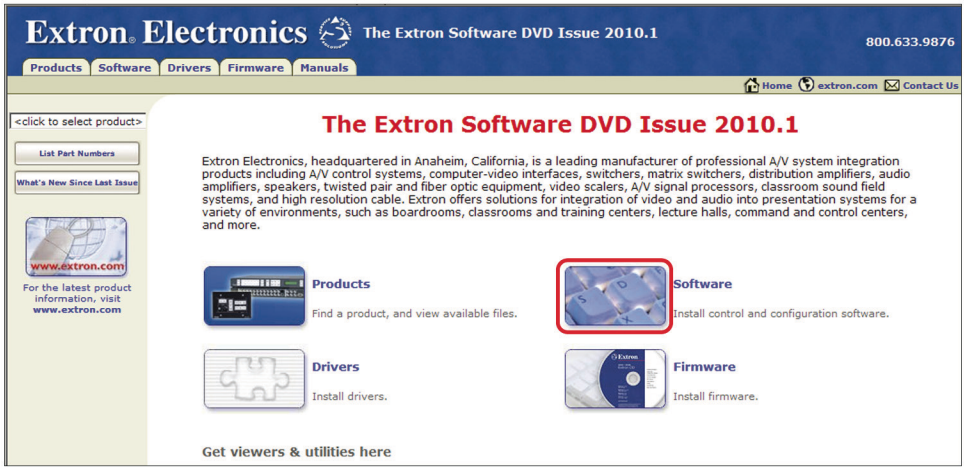


Figure 12. Software Button on the Disk Opening Screen

3. On the Control Software screen, scroll to locate the FOX Extenders line, and click the **Install** link in the far right column.

Figure 13. Install Link for the FOX Extenders Software

4. Follow the on-screen instructions to complete the installation.

   By default, the installer program creates a folder for the software at `C:\Program Files\Extron\FOX_Extenders` (all Windows systems **except** Windows 7) or `C:\Program Files (x86)\Extron\FOX_Extenders` (Windows7).

   An icon can be placed on the Windows desktop.

Downloading and Installing the Software from the Web

1. Visit the Extron website at **www.extron.com** and select the **Download** tab.
2. On the Download Center screen, click the **Control Software** button. A Control Software screen is displayed, containing a list of control software products.
3. In one of the linked alphabets at the top and bottom of the screen, click **F**.
4. On the "F" software products page, scroll to locate FOX Extenders, and click the **Download** link at the far right.

Figure 14. Download Link for the FOX Extenders Program

5. On the next screen, fill in the required information.
6. Click the **Download FOXExtendercs_vnxn.exe** button.
7. Follow the instructions on the download screens to download the software and install it on your computer.

Starting the Control Program

Start the Extron FOX Extenders Control Program as follows:

1. Set up and power on the units as described in the **Installation and Operation** section. Connect the computer to one of the control ports on either the transmitter or receiver.

2. Click **Start** > **All Programs** > **Extron Electronics** > **FOX Extender WCP** > **FOX Extender WCP** or click on the desktop icon (shown at right). The Communication Setup window opens.

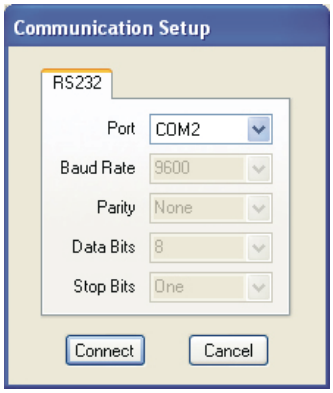


Figure 15. Communication Setup window

3. Select the Com port to which your transmitter or receiver is connected and click **Connect**. The Communication Setup window closes and the FOX Extenders Control Program window opens.

NOTE: Only Link 1, connecting the Tx port of the transmitter to the Rx port of the receiver, is required for video, audio, and serial command transmission. Link 2 (the return link) is not required; however, if it is not enabled, the ability to configure the system is limited by a lack of communication from the receiver to the transmitter.

FOX Extenders Main Window

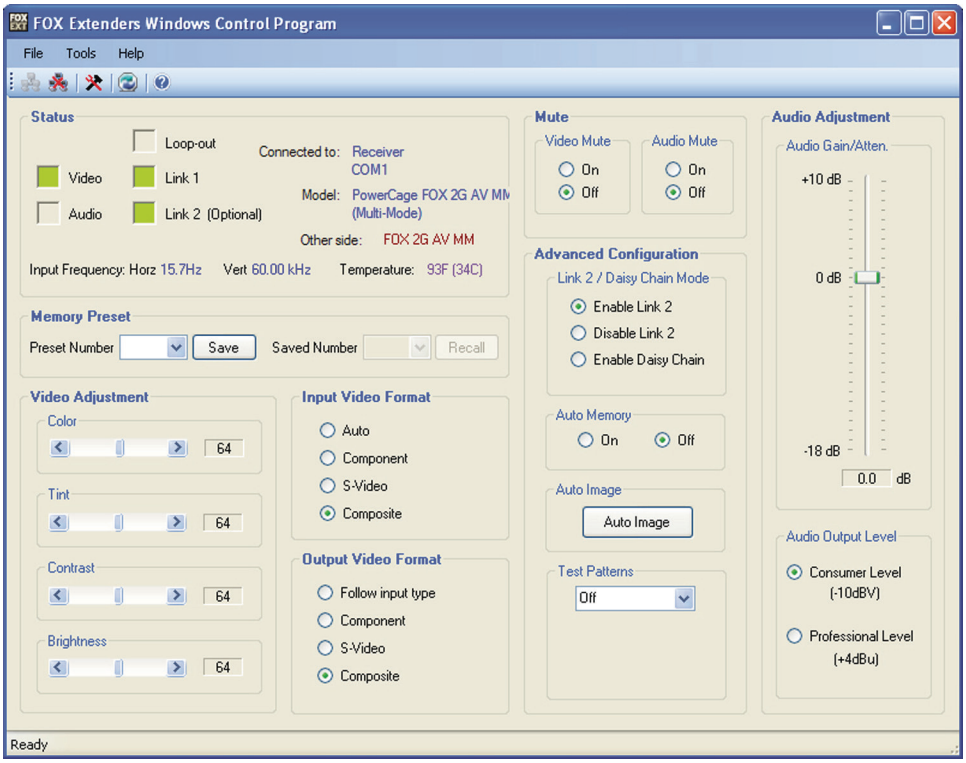


Figure 16. FOX Extenders Main Window

The FOX Extenders Control Program main window contains the following:

Menu bar and toolbar

The File, Tools, and Help menus on the menu bar provide access to various functions, including connecting to and disconnecting from the FOX Tx/Rx AV; viewing information about your unit such as firmware version, part number, and model name; uploading firmware; refreshing the status display; and opening the FOX Extenders control program help file. Some of these functions are also accessed by clicking buttons on the toolbar.

Figure 17. Toolbar on the Main Window

Accessing the help file

The FOX Extenders Control Program help file provides instructions on using the control program, including details on the functions available via the menus and toolbar buttons. You can view the help file by doing any of the following:

- From the Help menu, select **Contents**.
- Click the **Help**  button on the toolbar.
- Press F1 on your computer keyboard.

Status area

The Status area provides visual indications of the connection status:

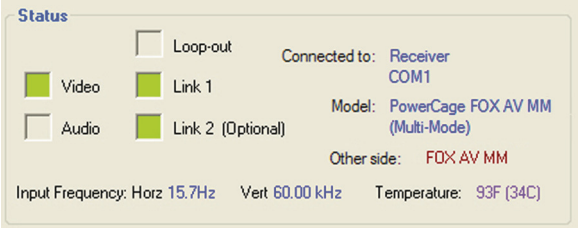


Figure 18. Status Area

- **Video indicator** — Shown in green when a composite, S-video, or component video signal is present
- **Audio indicator** — Shown in green when the transmitter detects an audio signal at or more than 35 dB below the nominal level. Stays green until the signal falls below this threshold continuously for 10 seconds.
- **Loop-out indicator** — Shown in green only if the computer is connected to the receiver
- **Link 1 indicator** — Shown in green when the receiver detects light on Link 1 (connecting the Tx port of the transmitter to the Rx port of the receiver). The receiver reports the status to the transmitter over Link 2.

  NOTE: If the computer is connected to either of the control ports on the transmitter and Link 2 is disconnected, the Link 1 indicator does not show green because when the receiver detects light on Link 1, it is not able to pass that information to the transmitter.

- **Link 2 (Optional) indicator** — Shown in green when the transmitter detects light on Link 2, the return link connecting the Tx port of the receiver to the Rx port of the transmitter. The transmitter reports the status to the receiver via Link 1.

  The status area also shows the unit type (transmitter or receiver) and model description for the unit to which the computer is connected, the unit at the other end of the fiber optic cable, and the Com port on the computer that is connected to the unit.

  It also provides information about the horizontal and vertical frequencies of the input signal and the internal temperature.

Memory Preset area

The Memory Preset area provides tools to save and recall memory presets. The parameters saved in a preset include color, tint, brightness, and contrast.

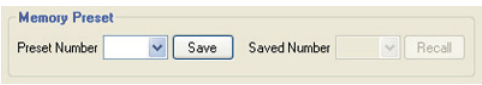
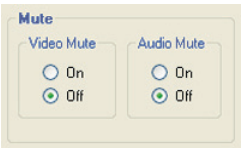


Figure 19. Memory Preset Area

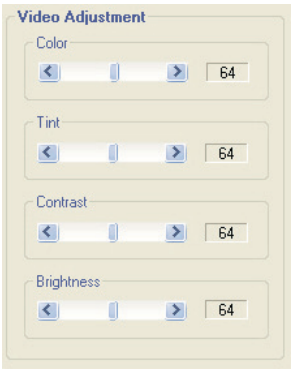
- **To save a preset**, select a number from the Preset Number drop-down menu and click **Save**. The current values of color, tint, contrast, and brightness are saved as a memory preset.
- **To recall a saved preset,** select a number from the Saved Number drop-down menu and click **Recall**.

Mute area



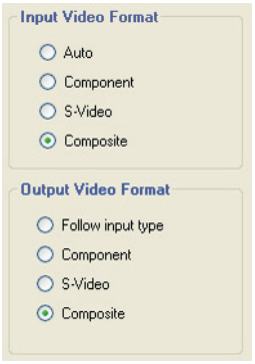
Select a radio button in the Mute area to mute or unmute the video or audio signal.

Video Adjustment area



Use the sliders to adjust the Color, Tint, Contrast, and Brightness of the picture that is displayed. All four of these variables can be adjusted to between 0 and 127, with the current value displayed in the text box to the right of the corresponding slider.

Video Format area



Select the radio buttons in the Video Format area to specify the input video format (**Auto**, **Component**, **S-video**, or **Composite**) and the output video format (**Follow input type**, **Component**, **S-video**, or **Composite**).

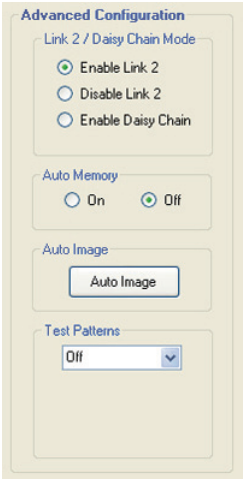
When there are two video sources, S-video through the 4-pin mini DIN connector and another format through the BNC connectors, the choice of radio button determines which input format is transmitted. When **Auto** is selected, the transmitter detects and sends the signal with the highest level format detected: component video first, S-video second, and composite video third.

When **Follow input type** is selected for the output format, the output signal is in the same format as the input signal.

NOTE: The transmitter converts the input signal into a proprietary signal type, which passes through Link 1 to the receiver. The receiver converts the signal back to the required type. This enables the input signal to be transcoded to meet the output device requirements.

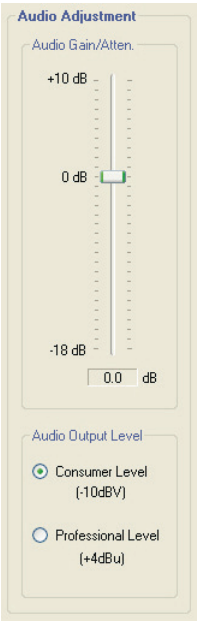
Advanced Configuration area

Select the radio buttons in the following fields to perform additional configuration:



- **Link 2/Daisy Chain Mode** — Select **Enable Link 2** or **Disable Link 2** to enable or disable the return link from the receiver to the transmitter. Alternatively, you can select **Enable Daisy Chain** and connect the receiver to another receiver.
- **Auto Memory** — When Auto Memory is on, previously saved values such as color, tint, contrast, and brightness are applied whenever the vertical field rate of the input changes. Auto Memory can be switched on or off using the radio buttons.
- **Auto Image** — Returns the video adjustment settings of color, tint, contrast, and brightness back to their default values (64).
- **Test Patterns** — If desired, select one of the built-in test patterns (color bars, grayscale, or alternating pixels) from the drop-down menu, for help calibrating the display device. When **Off** is selected, the receiver outputs the video signal from the source device.

Audio Adjustment area



- **Audio Gain/Attenuation** — A slider control enables you to adjust the input audio gain or attenuation value from –18 dB to +10 dB in 1.0 dB increments.

  NOTE: Changes to the input gain or attenuation are made in the transmitter. If your computer is connected to the receiver and Link 2 is not active, the gain and attenuation values are grayed out and cannot be changed.

- **Audio Output Level** — Select **`Consumer Level (–10 dBV)`** or **`Professional Level (+4 dBu)`** radio button for the audio output.

Updating Firmware

Firmware can be upgraded for the transmitter and the receiver unit via the PowerCage Config port using the Extron Firmware Loader utility from the FOX Extenders control program. The firmware can be downloaded to your computer from the Extron website (**www.extron.com**) and uploaded to the unit. The transmitter and receiver require different firmware and must both be upgraded separately.

NOTES:
- When firmware upgrades are available, they are unique to the unit — a transmitter firmware upgrade for the Tx unit and a separate receiver upgrade for the Rx unit.
- Your computer must be connected directly to the unit for the firmware to be updated.

Downloading the Firmware from the Website

To obtain the latest version of firmware for your PowerCage FOX Tx/Rx AV:

1. Visit the Extron website, **www.extron.com**, click the **`Download`** tab, and then click the **`Firmware`** link on the left sidebar menu.

Figure 20. Link to the Firmware Upgrade Files

2. On the Download Center screen, click the links for the appropriate firmware file.
3. Complete the Personal Information form and click the **`Download`** ***`filename`*** button.

Figure 21. Personal Information Form

4. Follow the instructions on the rest of the download screens to download the firmware update from the Extron website, and start the Extron Installation Program to extract the firmware file and place it in a folder identified in the program window.

NOTE: Take note of the folder to which the firmware file is saved.

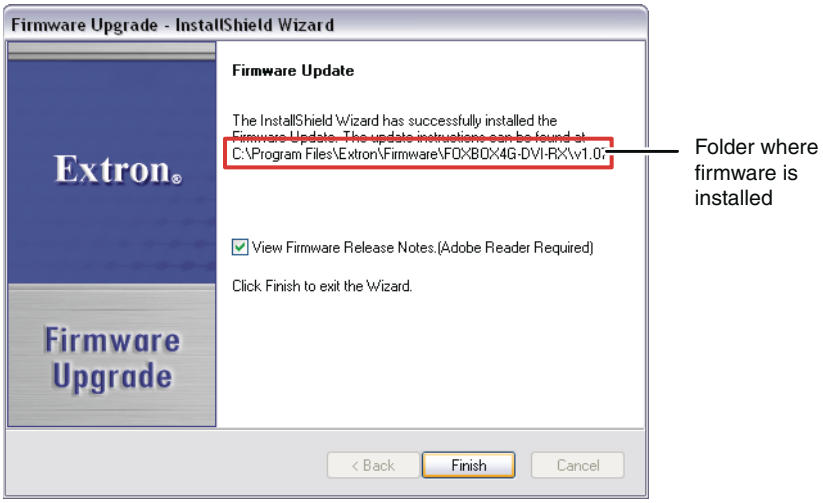


Figure 22. Location of the Firmware File

Loading the Firmware to the Transmitter and Receiver

Downloading the Firmware Loader

To load a new version of firmware to your transmitter and receiver, you must have the Firmware Loader software loaded on your computer. If you do not have this software, download it from the Extron website as follows:

1. On the Extron website, click the **Download** tab.
2. On the Download Center page, click **Software** on the left sidebar menu.
3. Locate the "Firmware Loader" line and click the **Download** link at the far right.

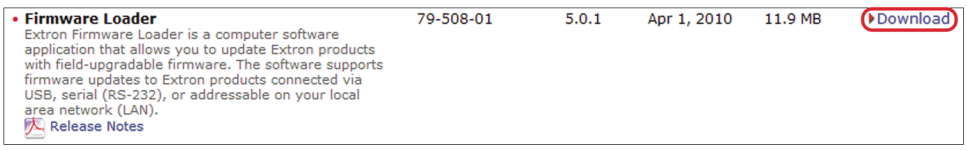


Figure 23. Firmware Loader Download Link

4. Follow the instructions on the download screens to save the installer file to your computer.
5. In Windows Explorer or another file browser, locate the Firmware Loader executable file in your computer's file system and double-click on it to open it.
6. Follow the instructions on the Installation Wizard screens to install the Firmware Loader on your computer. Unless you specify otherwise, the installer program places the Firmware Loader file, "FWLoader.exe" at C:\Program Files\Extron\FWLoader.

   NOTE: In Windows 7, the file is located at C:\Program Files (x86)\Extron\FWLoader.

   If the Extron and FWLoader folders do not yet exist in your Program Files folder, the installer creates them.

Updating the PowerCage FOX firmware

The serial port on your computer must be connected to the Config port on the PowerCage 1600 front panel. See "**RS-232 Connections**" in the "Installation and Operation" section for more information.

1. Within the FOX Extenders program, click the **`Firmware Loader`** button on the toolbar.

   NOTE: If the Firmware Loader button does not appear on the program toolbar, the Firmware Loader software is not installed. See "Downloading the Firmware Loader," above.)

2. If you have not previously updated firmware for the PowerCage FOX unit, the Add Device window opens. From the drop-down menus on the RS-232 screen, select the appropriate Com port number and baud rate (the default is 9600). (See the illustration on the next page.)

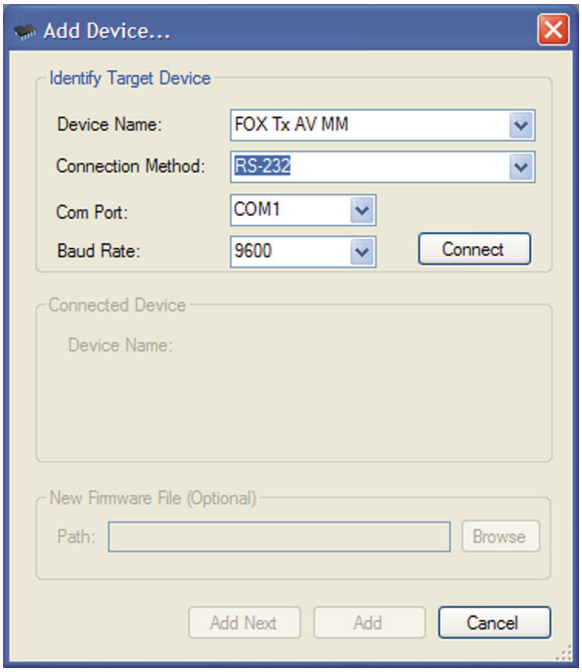


Figure 24. Add Device Window

If you have previously updated firmware for this model,the Firmware Loader window appears. Proceed to step **4**.

3. Click **Connect**. The Firmware Loader window appears.

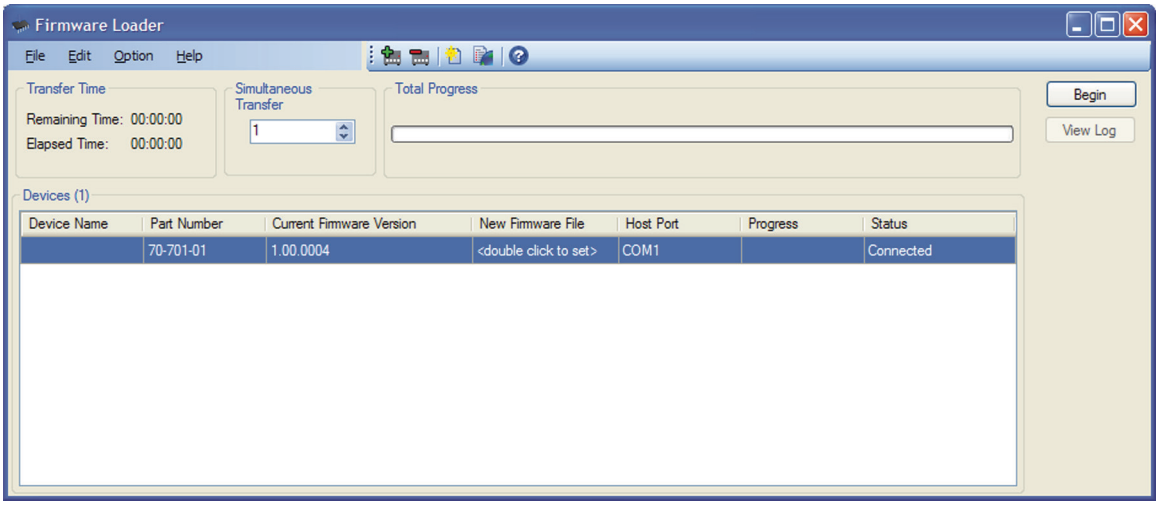


Figure 25. Extron Firmware Loader Window

4. In the Devices field, select your PowerCage FOX Tx/Rx AV unit, then select **New Firmware for Selected Devices** from the File menu.

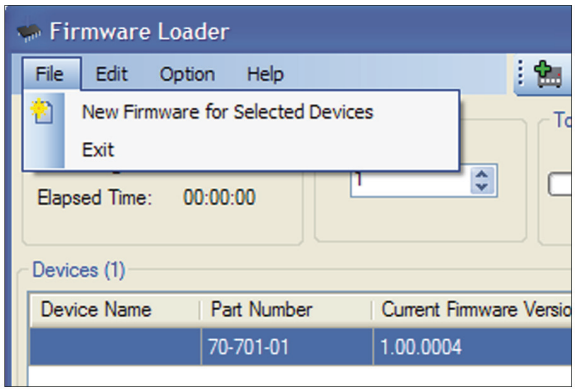


Figure 26. Firmware Loader File Menu

5. The Choose Firmware File window opens.

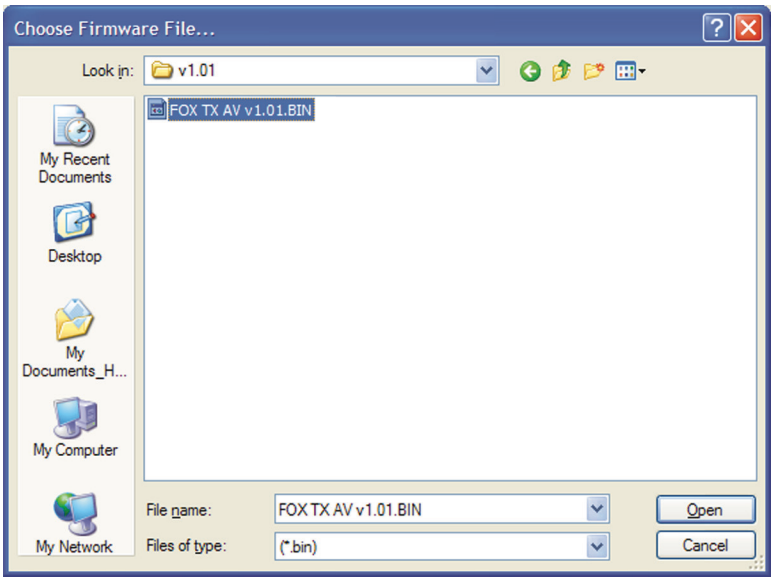


Figure 27. Choose Firmware File Window

6. Navigate to and select the new firmware file, which has a **.bin** extension, and click **Open**. The Choose Firmware File window closes.

CAUTION: The firmware file must have a .bin extension. Uploading other file types can cause the switcher to stop functioning.

NOTE: When downloaded from the Extron website, the firmware is placed in a subfolder of `C:\Program Files\Extron\Firmware` or `C:\Program Files (x86)\Extron\Firmware` (for Windows 7).

7. In the Firmware Loader window, click **Begin**.

   The Total Progress and Progress status bars show the progress of the firmware upload. The upload to the switcher may take several minutes. After the status bars have progressed from 0% to 100%, and Status is listed as `Completed`, the firmware loader utility resets the unit.

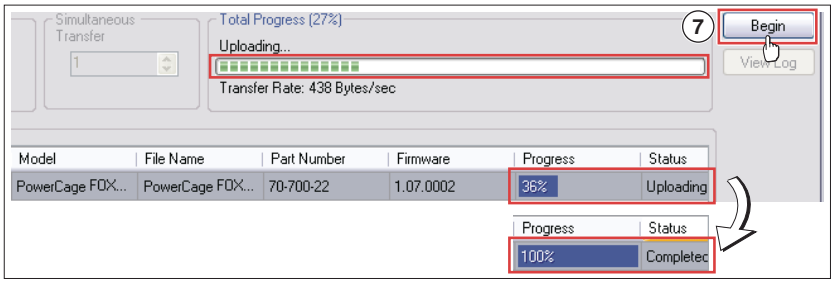


Figure 28. Progress Status Bars on the Firmware Loader Screen

8. Click **Exit** to close the Firmware Loader.

Reference Information

This section discusses the specifications, part numbers, and installation instructions for the PowerCage FOX Tx/Rx AV Tx/Rx Fiber Optic Extenders. Topics that are covered include:

- **Specifications**
- **Part Numbers**
- **Installing the FOX Tx/Rx AV Board in the PowerCage 1600 Enclosure**

Specifications

NOTES: The PowerCage FOX Tx/Rx AV boards are available in singlemode or multimode versions.

The optional PowerCage FOX boards are class 1 laser products. They meet the safety regulations of IEC-60825, FDA 21 CFR 1040.10, and FDA 21 CFR 1040.11.

Optical specifications — PowerCage FOX boards, interconnection between transmitter and receiver

Number/type ..... 1 singlemode or 1 multimode fiber optic input and output per board, up to 16 single space or 8 double space boards per PowerCage enclosure

NOTE: Only one fiber is required to transmit video, audio, and unidirectional data. A second fiber is required to transmit return data for bidirectional control/communication.

Connectors ..... 2 bidirectional LC connectors per board

Operating distance

- Singlemode ..... 30 km (18.75 miles) with singlemode (SM) cables with a SM board
- Multimode..... 300 m (985') with 62.5 µm multimode (MM) cable and a MM board
  1 km (3280') with 50 µm multimode (MM) cable and a MM board
  2 km (6561') with 50 µm 2000 MHz bandwidth laser optimized MM cable and a MM board

NOTE: Operating distances are approximate. These are typical distances. The maximum distance may be greater than these typical numbers depending on factors such as fiber type, fiber bandwidth, connector splicing, losses, modal or chromatic dispersion, environmental factors, and kinks.

Nominal peak wavelength..... 850 nm for multimode (MM), 1310 nm for singlemode (SM)

Transmission power, singlemode or multimode
-5 dBm, typical

Maximum receiver sensitivity

- Singlemode ..... -18 dBm, typical
- Multimode..... -12 dBm, typical

Optical loss budget

- Singlemode ..... 13 dB, maximum
- Multimode..... 7 dB, maximum

Maximum channel data rate..... 2.125 Gbps

Video

NOTE: For PowerCage FOX Tx/Rx AV boards, the analog video input signal is digitized pixel for pixel in the transmitter, sent digitally through the fiber cable, and converted back to analog video in the receiver.

Gain	Unity
Standards	
Input	NTSC 3.58, NTSC 4.43, PAL, SECAM, autodetected
Output	NTSC 3.58, PAL (follows vertical rate)
Decoder type	Adaptive 2D, digital comb filter

Video input

Number/signal type	1 component (Y, R-Y, B-Y), S-video, composite video
Connectors	1 x 3 female BNC or 1 female 4-pin mini DIN for S-video
Nominal levels	1.0 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for R-Y, B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels	Analog: 0.3 V to 1.5 Vp-p with no offset
Impedance	75 ohms
Return loss	-30 dB for Y/VID, B-Y/C, R-Y @ 5 MHz
Input coupling	AC

Video output

Number/signal type	1 component (Y, R-Y, B-Y) video, S-video, composite video
Connectors	1 x 3 female BNC or 1 female 4-pin mini DIN for S-video
Nominal levels	1.0 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for R-Y, B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels	0.3 V to 1.5 Vp-p
Impedance	75 ohms @ 5 MHz
Return loss	<-40 dB @ 5 MHz
DC offset	+350 mV, maximum, with input at 0 offset
Video delay	1-2 frames

Audio

NOTE: In PowerCage FOX boards, the analog audio signals is digitized in the transmitter, sent through the fiber cable, and converted back to analog audio in the receiver.

Gain	
Range	Adjustable, -18 dB to +10 dB
Default	Unbalanced output: -6 dB; balanced output: 0 dB
Frequency response	20 Hz to 20 kHz, ±0.5 dB
THD + Noise	
VGA and DVI boards	0.10% @ 1 kHz at nominal level
AV boards	0.15% @ 1 kHz at nominal level
S/N	>80 dB at maximum output (unweighted)
CMRR	65 dB @ 20 Hz to 20 kHz
Audio bits per sample	18 bits per channel, 2 channels (L, R)
Sampling rate	48 kHz

Audio input

Number/signal type	1 stereo, balanced/unbalanced **or** 2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	>10k ohms unbalanced, >20k ohms balanced, DC coupled

Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level	+17 dBV, (unbalanced) at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio output

Number/signal type	1 stereo, balanced/unbalanced **or** 2 mono, balanced/unbalanced
Connector	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Nominal levels	+4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level (Hi-Z)	>+19 dBu, unbalanced at 1% THD+N
Maximum level (600 ohm)	>+15 dBm, unbalanced at 1% THD+N
Audio delay	1.5 frames

Control/remote

Serial control ports	
Enclosure	1 bidirectional RS-232, 2.5 mm mini stereo jack (front panel)
PowerCage FOX boards	
Control	1 bidirectional RS-232, 3.5 mm captive screw connector, 5 pole (uses 3 poles; shared with the alarm port)
Pass-through	1 RS-232, 3.5 mm captive screw connector, 5 pole (3 pins are used, "RS-232 Over Fiber")
Baud rate and protocol	
PowerCage FOX boards	
Control	9600 baud, 8 data bits, 1 stop bit, no parity
Pass-through	9600 to 115,200 baud
Serial control pin configurations	
Captive screw connector	1 = Tx, 2 = Rx, 3 = GND
Mini stereo jack	RS-232: tip = Tx, ring = Rx, sleeve = GND
Program control	Extron FOX Extenders Control Program for Windows® Extron Simple Instruction Set (SIS™)

General

Power consumption*	1 or 2* (positive-negative), 100 VAC to 240 VAC, 50-60 Hz; internal, hot-swappable *A redundant power supply is optional.
System	Enclosure without boards: 12.40 watts at 115 VAC, 60 Hz
Each FOX board at 115 VAC, 60 Hz	
FOX Tx AV	6.89 watts
FOX Rx AV	5.57 watts
Power input requirements (boards)	12 VDC, 1.0 A, supplied by the PowerCage enclosure
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing
Cooling	Enclosure: fans, front to back Boards: convection, within the PowerCage enclosure
Mounting — PowerCage enclosure	
Rack mount	Yes
Enclosure type	Metal
Enclosure dimensions	
PowerCage enclosure	5.25" H x 17.0" W x 12.25" D (3U high, full rack wide) 13.3 cm H x 43.2 cm W x 31.2 cm D (Depth excludes connectors on the optional boards. Width excludes rack ears.)
PowerCage FOX boards	Fits a double slot opening in a PowerCage enclosure.

Product weight	
PowerCage enclosure	11.6 lbs (5.3 kg)
PowerCage FOX boards	1.1 lbs (0.5 kg)
Shipping weight	
PowerCage enclosure	13 lbs (6 kg)
PowerCage boards	2 lbs (1 kg) each
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, FDA Class 1, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTES: All nominal levels are at ±10%.

Specifications are subject to change without notice.

Part Numbers

PowerCage FOX Tx/Rx AV

PowerCage Enclosure and Boards	Part Number
PowerCage 1600 Enclosure	60-978-01
PowerCage FOX Tx AV MM (transmitter)	70-702-11
PowerCage FOX Tx AV SM (transmitter)	70-702-12
PowerCage FOX Rx AV MM (receiver)	70-702-21
PowerCage FOX Rx AV SM (receiver)	70-702-22

Included Parts

Included Parts	Part Number
MM or SM fiber patch cable	
5-pole 3.5 mm blue captive screw	
2-pole 3.5 mm blue captive screw	
PowerCage FOX Tx/Rx AV Setup Guide	
Audio Connector Wiring Instruction Card	

Optional Accessories

Accessory	Part Number
MHR-2 SV M-M Series: Male to Male 4-pin Mini DIN S-video cables	26-316-0x
MHR-2P SVM-M: Male to Male 4-pin Mini DIN S-video cables (Plenum)	26-522-0x
MHR-4 BNC Series: BNC Male to Male four conductor MHR	26-210-0x
MHR-5P BNC Series: BNC Male to Male five conductor MHR (Plenum)	26-378-xx
RG6-5 BNC Series: BNC Male to Male five conductor RG6 Super High Res.	26-369-xx

Installing the FOX Tx/Rx AV Board in the PowerCage 1600 Enclosure

Up to 16 single slot or 8 dual slot boards can be inserted into the PowerCage enclosure. The boards may vary with each installation depending on the configuration and use.

NOTES: All boards are "hot-swappable," meaning that they can be installed or removed without turning off or disconnecting the power to the PowerCage Enclosure.

Use ESD precautions when installing the FOX 3G HD-SDI board to avoid damaging it. Keep the board in the anti-static bag until it is needed. Use proper grounding techniques during installation.

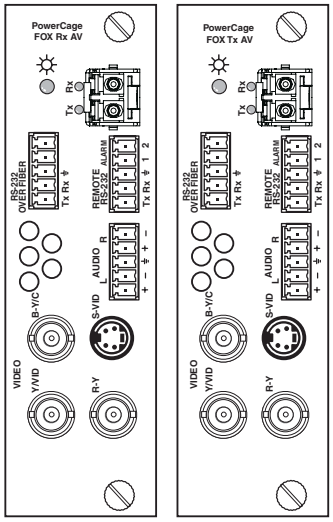
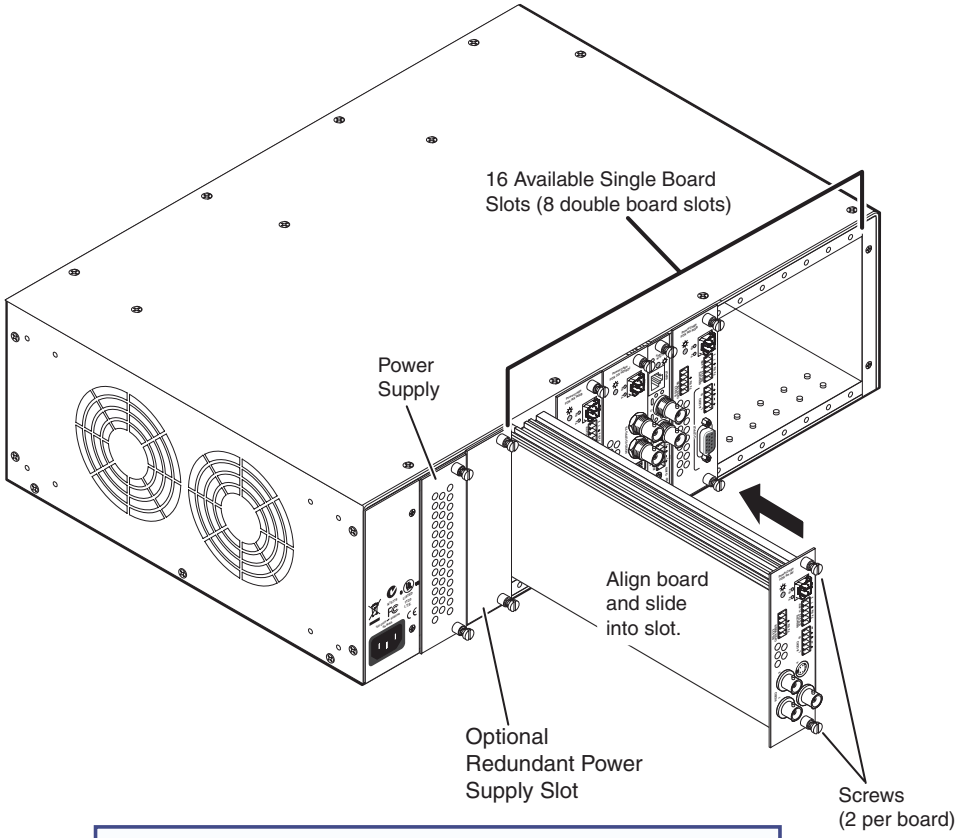


Figure 29. PowerCage FOX TX/RX AV Boards

Inserting the Board into the Slot

1. Hold the board with the signal connectors towards you and the LED at the top, and align the top and bottom grooves of the board with the slide posts in the selected enclosure slot.
2. Carefully slide the board into the slot, aligning the two tabs on the lower front end of the board with the matching ports in the enclosure.
3. Push the board firmly into place. Tighten the screws to secure the board in position.

NOTE: In addition to the 16 single board slots (8 dual board slots) are 2 dual slots that are reserved for power supplies only. The PowerCage 1600 comes with a dual slot power supply board already installed, but an optional redundant power supply board may be added using **only** the dual slot position immediately adjacent to the existing power supply. See the illustration on the next page.



NOTE: Power supplies can occupy only these two power supply slots. (Each power supply can be mounted in either slot.)

Figure 30. Inserting a PowerCage FOX Tx/Rx AV Board into the PowerCage 1600 Enclosure

NOTE: Use a screwdriver or other tool to fully tighten the screws after initial installation and any subsequent removal and replacement of the board.

4. If desired, connect power to the enclosure and verify that the fans, board, and LEDs power up correctly; then disconnect power.
5. Finish installing the PowerCage Enclosure. Refer to the *PowerCage 1600 Enclosure User Guide*, available on the Extron website at **www.extron.com**.

Removing a Board from a Slot

1. Completely loosen the two screws on the rear panel board that secure the board in place.
2. Slide the board out from the rear and remove it from the slot.

Extron® Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe, Africa, and the Middle East:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500 **Europe**: +31.33.453.4040
Asia: +65.6383.4400 **Japan**: +81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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